

U. S. FISH AND WILDLIFE SERVICE
SPECIES ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM

SCIENTIFIC NAME: *Hypolimnys octacula mariannensis*

COMMON NAME: Mariana eight spot butterfly

LEAD REGION: Region 1

INFORMATION CURRENT AS OF: September 2005

STATUS/ACTION:

☐ Species assessment - determined species did not meet the definition of endangered or threatened under the Act and, therefore, was not elevated to Candidate status

☐ New candidate

☒ Continuing candidate

☐ Non-petitioned

☒ Petitioned - Date petition received: May 11, 2004

☐ 90-day positive - FR date:

☒ 12-month warranted but precluded - FR date: May 11, 2005

☐ Did the petition request a reclassification of a listed species?

FOR PETITIONED CANDIDATE SPECIES:

a. Is listing warranted (if yes, see summary of threats below)? yes

b. To date, has publication of a proposal to list been precluded by other higher priority listing actions? yes

c. If the answer to a. and b. is "yes", provide an explanation of why the action is precluded. We find that the immediate issuance of a proposed rule and timely promulgation of a final rule for this species has been, for the preceding 12 months, and continues to be, precluded by higher priority listing actions. During the past 12 months, most of our national listing budget has been consumed by work on various listing actions to comply with court orders and court-approved settlement agreements, meeting statutory deadlines for petition findings or listing determinations, emergency listing evaluations and determinations and essential litigation-related, administrative, and program management tasks. We will continue to monitor the status of this species as new information becomes available. This review will determine if a change in status is warranted, including the need to make prompt use of emergency listing procedures. For information on listing actions taken over the past 12 months, see the discussion of "Progress on Revising the Lists," in the current CNOR which can be viewed on our Internet website (<http://endangered.fws.gov>).

☐ Listing priority change

Former LP: ☐

New LP: ☐

Date when the species first became a Candidate (as currently defined): 1997

☐ Candidate removal: Former LP: ☐

☐ A – Taxon is more abundant or widespread than previously believed or not subject to the degree of threats sufficient to warrant issuance of a proposed listing or

continuance of candidate status.

- ___ U – Taxon not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status due, in part or totally, to conservation efforts that remove or reduce the threats to the species.
- ___ F – Range is no longer a U.S. territory.
- ___ I – Insufficient information exists on biological vulnerability and threats to support listing.
- ___ M – Taxon mistakenly included in past notice of review.
- ___ N – Taxon does not meet the Act’s definition of “species.”
- ___ X – Taxon believed to be extinct.

ANIMAL/PLANT GROUP AND FAMILY: Insects; Family Nymphalidae (butterfly)

HISTORICAL STATES/TERRITORIES/COUNTRIES OF OCCURRENCE: Guam; Commonwealth of the Northern Mariana Islands (CNMI), island of Saipan.

CURRENT STATES/COUNTIES/TERRITORIES/COUNTRIES OF OCCURRENCE: Guam

LAND OWNERSHIP:

The lands that support populations of this butterfly are owned by private landowners (three populations), the Government of Guam (one population), and the U.S. Government (six populations).

LEAD REGION CONTACT: Paul Phifer (503) 872-2823, paul_phifer@fws.gov

LEAD FIELD OFFICE CONTACT: Pacific Islands Fish and Wildlife Office, Lorena Wada (808) 792-9400, lorena_wada@fws.gov

BIOLOGICAL INFORMATION:

Species Description: The Mariana eight spot butterfly (*Hypolimnna octacula mariannensis*) is endemic to the islands of Guam and Saipan in the Mariana archipelago. Like most nymphalid butterflies, orange and black are the two primary colors exhibited by this subspecies. The males are smaller than the females by at least a third or more in size. Males are predominantly black with an orange stripe running vertically on each wing. The stripe on the hindwings exhibits small black dots in a vertical row. Overall, the females appear more orange in color than the males, and black bands across the apical (top) margins of both pair of wings are exhibited. Along the inner margin of these black bands, large white spots are exhibited across the entire length of the wings (Swezey 1942).

Taxonomy: This subspecies was originally described by Butler and is recognized as a distinct taxon (Swezey 1942). The taxonomy of this species has not been examined since it was originally described. Swezey is the most recent and accepted taxonomic write up for this species.

Habitat: The larvae of this butterfly feed on two native plants, *Procris pedunculata* and

Elatostema calcareum. Both of these forest herbs (Family Urticaceae) grow only on karst limestone, thus limiting the breeding habitat of this butterfly (Schreiner and Nafus 1996).

Historic and Current Range/Distribution: The Mariana eight spot butterfly was apparently always uncommon on Guam and declined due to drought and browsing of the host plants by nonnative deer (Schreiner and Nafus 1996). During surveys initiated in 1995 of Saipan, several areas were found that supported good populations of the host plants, but no individuals of the Mariana eight spot butterfly were seen (Schreiner and Nafus 1996); the subspecies is believed to be extirpated from Saipan. Surveys on the island of Guam located 10 populations (Fadian Cove, Hilaan (2 populations), Mangilao golf course (2 populations), Orote, Pagat (2 populations), and Tweeds Cove (2 populations) of the Mariana eight spot butterfly (Schreiner and Nafus 1996).

THREATS:

- A. The present or threatened destruction, modification, or curtailment of its habitat or range. Sweeping ecological changes took place on Guam and in the CNMI during the Japanese occupation from 1914-1944 (Fosberg 1960; Engbring *et al.* 1986). Extensive removal of native forests for the development of sugar cane was pursued on all of the main islands. In 1920, Crampton (1925) stated that much deforestation had occurred in the southern half of Guam and that the savanna grassland habitat (which is unsuitable for this butterfly) had greatly expanded during “recent centuries.” He also notes that extensive wood cutting has reduced the forest canopy.

During and after World War II, dramatic reductions in butterfly forest habitat occurred on the island of Saipan where major military operations, bombing, and landings were conducted. Following the war, open agricultural fields on Guam and Saipan and other areas prone to erosion, were seeded with tangantangan (*Leucaena leucocephala*) by the U.S. Military (Fosberg 1960). Tangantangan grows as a single species stand with no substantial understory. The microclimatic conditions are dry with little accumulated leaf litter humus (Hopper and Smith 1992). It is particularly unsuitable as butterfly habitat. In addition, native forest cannot reestablish and grow where this alien weed has become established (Hopper and Smith 1992).

Of the vegetation types found on the islands of Guam and Saipan, only limestone forest supports the host plants needed by the species. In 2002, Donnegan *et al.* (2004) completed a forest inventory and analysis for the island of Guam. They estimated that approximately 48 percent (25,833 hectares) of the island was forested. Of the forested area, approximately 17,970 hectares were classified as limestone forest, the majority of which was located in northern Guam, approximately 7,741 hectares were classified as volcanic forest, primarily found in southern Guam. Of the remaining lands on Guam (29,068 hectares), 33 percent (17,991 hectares) was classified as savanna or fernland, 18 percent (9,695 hectares) was classified as urban, and the remaining 1 percent of the island was classified as either barren lands, water, or unclassified.

In 1984, Falanruw *et al.* (1989) completed a vegetation survey of the island of Rota, Tinian, and Saipan. They reported that approximately four percent (478 hectares) of the island of Saipan supported native limestone forest. Of the remaining lands on Saipan (11,295

hectares), 42 percent (4,895 hectares) was classified as introduced forest (tangentan, agroforests, and *Casuarina litorea* thickets), 30 percent (3,501 hectares) was classified as secondary vegetation (natural vegetation replaced by fast growing weedy species), 11 percent (1,310 hectares) was classified as savanna or grassland, 4 percent (450 hectares) was classified as strand vegetation, 6 percent (745 hectares) was classified as urban, and the remaining 3 percent (394 hectares) of the island was classified as barren, water, marsh, cropland, atoll forest, or mangroves.

In addition to human related habitat loss, both Guam and Saipan are subject to regular typhoons which modify the remaining forests through defoliation and downed trees. Guam, for example, has been affected by typhoons in 37 of the last 50 years (based on records compiled by U.S. Navy, Joint Typhoon Warning Center). During the 1990s Guam experienced 20 typhoons, and supertyphoons (having gusts exceeding 240 kilometers (150 miles) per hour) occur with regularity (about once every 5 to 10 years). There is some evidence that the frequency of severe storms (estimated gusts exceeding 160 kilometers (100 miles) per hour) is increasing in the Mariana Islands. With reference to Guam, the historical record shows increasing numbers of mild (estimated gusts in the range of 80 to 160 kilometers (50 to 100 miles) per hour) and severe storms over the last three centuries, as well as in just the last decade. Vegetation changes associated with such storms have opened up forested areas to desiccation and invasion by alien weeds, making them unsuitable as butterfly habitat.

Other than limited hunting of deer on the Guam National Wildlife Refuge and at Anderson Air Force Base (Anne Brooke, USFWS, pers.comm. 2005), there are no other conservation efforts being undertaken to reduce the loss of habitat for this species.

B. Overutilization for commercial, recreational, scientific, or educational purposes.

We are unaware of any current collecting of this subspecies for commercial, recreational, scientific, or educational purposes. However, rare butterflies and moths are highly prized by collectors (Morris *et al.* 1991), who often take all individuals obtainable (59 FR 18350; U.S. Department of Justice, *in litt.* 1993). For instance, there has been a standing reward for specimens of the rare Hawaiian sphinx moth (*Tinostoma smargdites*) (Zimmerman 1958). On at least two occasions prior to its listing, sphingid researchers from abroad had formally requested specimens of Blackburn's sphinx moth from Bishop Museum staff (F. Howarth, pers. comm., 1999; S. Montgomery, pers. comm., 2000). It is unknown whether the species had been illegally traded or collected prior to or since its listing, and there is no clear agreement among researchers regarding the moth's appeal or lack thereof to black market collectors of Lepidoptera (A. Medeiros, pers. comm., 1998; F. Howarth, pers. comm., 1999; S. Montgomery, pers. comm., 2000). The listing of butterflies as federally endangered may increase their attractiveness to collectors of rare species (U.S. Department of Justice, *in litt.* 1993). Unrestricted collecting and handling are known to impact populations of other species of rare Lepidoptera (Murphy 1988) and are considered to be potential threats to the Mariana eight spot butterfly.

No conservation measures have been taken to address these threats for this species.

C. Disease or Predation.

Numerous alien predators and parasitoids of Lepidoptera have become established, purposefully or inadvertently, in the Mariana Islands and these have been documented to attack and significantly impact other species of native butterflies (Peterson 1957; Schreiner and Nafus 1986; Nafus 1989, 1992, 1993a, b, c). These alien predators and parasitoids undoubtedly contribute to the decline of this butterfly. The possibility of the establishment of additional predators and parasitoids that will attack this subspecies is a significant threat.

Ants can be particularly destructive predators because of their high densities, recruitment behavior, aggressiveness, and broad range of diet (Reimer 1993). The latter attribute allows some ants to affect prey populations independent of prey density, and ants can therefore locate and destroy isolated individuals and populations (Nafus 1993a). Ants prey on all immature stages of Lepidoptera and can completely exterminate populations (Illingworth 1915; Zimmerman 1958). During some times of the year, alien ants destroyed virtually all the eggs of the related butterfly *Hypolimnas bolina* in Guam (Nafus 1992) and predation by alien ants is the primary cause of mortality (>90 percent) in the Mariana eight spot butterfly (Schreiner and Nafus 1996).

Small wasps in the family Trichogrammatidae parasitize insect eggs, with numerous adults sometimes developing within a single host egg. The taxonomy of this group is confusing but at least two native species attack the eggs of butterflies in the Mariana Islands, including the Mariana eight spot butterfly (Schreiner and Nafus 1996). Several alien species are established in the Mariana Islands, including, *Trichogramma chilonis* which effectively limits populations of the sweetpotato hornworm in Guam (Nafus and Schreiner 1986) and is a potential threat to the Mariana eight spot butterfly. There has been no recent research on parasitoid wasp impacts to the Mariana eight spot butterfly. However, the impact of parasitoid wasps on non-target species, including butterflies and moths, is well established for other species in the Mariana Islands (Nafus 1992, 1993a, b, c).

The introduced biological control agent, *Brachymeria lasus*, parasitizes up to 20 percent of the pupae of the related butterfly *H. bolina* in Guam (Nafus 1992). While this wasp has not been observed to attack the Mariana eight spot butterfly, only 16 pupae have been studied in the field, and this wasp is a potential threat to this rare butterfly (Drost and Carde 1992).

There are no conservation efforts being undertaken to reduce the threat of parasites or predators for this species.

D. The inadequacy of existing regulatory mechanisms.

Alien predatory and parasitic insects are one of the primary causes of the reduction in range and abundance of this butterfly. Some of these alien species have been purposefully introduced by the Territorial agricultural agencies (Nafus and Schreiner 1986) and importations and augmentations of lepidopteran parasitoid species continues. Federal regulations for the introductions of bio-control agents are inadequate (Howarth 1991; Lockwood 1993). The limited Federal review process requires consideration of potential harm only to listed threatened and endangered and economically important species (Miller

and Aplet 1993). Existing regulations do not require post-release impacts on non-target organisms, and host range cannot be predicted from laboratory studies (Gonzalez and Gilstrap 1992; Roderick 1992). The purposeful release or augmentation of any lepidopteran predator or parasitoid is a potential threat to this butterfly (Simberloff 1992).

There are no conservation efforts being carried out to reduce this threat for this species.

E. Other natural or manmade factors affecting its continued existence.

The Mariana eight spot butterfly has 10 remaining populations which somewhat decreases the potential for extinction from stochastic events. However, these 10 populations are closely grouped within a fairly small range. These butterflies are good fliers, and in an undisturbed setting, probably existed as a series of meta-populations (Harrison *et al.* 1988), with considerable movement between demes and continued colonization and extinction in disparate localities. Nonnative predators and parasitoids, and the loss of its host plant, have extirpated all populations of this butterfly on Saipan and have greatly reduced its numbers on Guam. If the Guam populations are severely reduced or eliminated, there will be less potential for recolonization (Brown and Kodric-Brown 1977). New purposeful introductions or augmentative releases of existing parasitoids for control of pest Lepidoptera pose a great threat to this subspecies.

Even if the threats responsible for the decline of this subspecies were controlled, the persistence of existing populations is hampered by the small number of extant populations and the small geographic range of the known populations. Small populations are also particularly vulnerable to reduced reproductive vigor caused by inbreeding depression, and they may suffer a loss of genetic variability over time due to random genetic drift, resulting in decreased evolutionary potential and ability to cope with environmental change (Lande 1988; Conservation Update 1994). Small populations are also demographically vulnerable to extinction caused by random fluctuations in population size and sex ratio and to catastrophes such as typhoons (Lande 1988).

There are no conservation efforts being undertaken to address these threats for this species.

CONSERVATION MEASURES PLANNED OR IMPLEMENTED

The Guam National Wildlife Refuge (Refuge) was created on October 1, 1993, with additional lands incorporated in 1994 by cooperative agreements between the U.S. Fish and Wildlife Service, the U.S. Air Force, and the U.S. Navy. The establishment and management of the Refuge on U.S. Navy and U.S. Air Force land provide a commitment for a “coordinated program centered on the protection of endangered and threatened species and other native flora and fauna...” Enactment of such a program by these agencies will contribute to the continued survival and recovery of this subspecies on Guam, as six of 10 populations are found within the Refuge boundaries.

SUMMARY OF THREATS

The host plants (*Procris pedunculata* and *Elatostema calcareum*) of this butterfly are still present on Guam but have severely declined as result of development, browsing by sambar deer (*Cervus*

mariannus), and displacement by alien species. There is some hunting of the deer on the island (Anne Brooke, USFWS, pers.comm. 2005). Loss of habitat plus the predation by alien parasitoids have probably been the major factors in the decline of this butterfly on Guam and its extirpation from Saipan.

LISTING PRIORITY

THREAT			
Magnitude	Immediacy	Taxonomy	Priority
High	Imminent	Monotypic genus	1
		Species	2
		Subspecies/population	3*
	Non-imminent	Monotypic genus	4
		Species	5
		Subspecies/population	6
Moderate to Low	Imminent	Monotypic genus	7
		Species	8
		Subspecies/population	9
	Non-imminent	Monotypic genus	10
		Species	11
		Subspecies/population	12

Rationale for listing priority number:

Magnitude:

This subspecies' range is very limited and its remaining populations are highly threatened by impacts resulting from the browsing, trampling, and uprooting of its host plants by alien deer. There is some hunting of the deer on the island, however, the refuge and military lands of northern Guam have some of the highest densities of ungulates (Anne Brooke, USFWS, pers.comm. 2005). In addition this species has extremely high mortality (>90 percent) of eggs and larvae due to predation by alien ants and wasps. The threats of habitat loss by ungulate browsing, and parasitism and predation by nonnative insects occurs range-wide. There are no efforts being undertaken to control or eradicate the threat of nonnative insects.

Imminence:

Direct threats to the Mariana eight spot butterfly from alien predators and parasites and indirect threats from impacts to its host plants by browsing ungulates are all considered imminent because they have been occurring for many years and are on-going.

Yes Have you promptly reviewed all of the information received regarding the species for the purpose of determining whether emergency listing is needed?

Is Emergency Listing Warranted?

No. The subspecies is not considered for emergency listing at this time because the immediacy of the threats is not so great as to imperil a significant proportion of the subspecies' total

populations within the time frame of the routine listing process. If it becomes apparent that the routine listing process is not sufficient to prevent large losses that may result in this subspecies' extinction, then the emergency rule process for this subspecies will be initiated. We will continue to monitor the status of the Mariana eight spot butterfly as new information becomes available. This review will determine if a change in status is warranted, including the need to make prompt use of emergency listing procedures.

DESCRIPTION OF MONITORING

We conducted literature searches for recent articles on this subspecies and attempted to contact relevant species experts regarding the current status of this subspecies. No new information on the subspecies was found, and there is no new information on the numbers of individuals or populations, or on threats to the subspecies. However, information contained in this form was verified by the respondents.

This level of monitoring is appropriate to update the status of this species since we are unaware of any entity doing periodic surveys or that are studying this species. The taxonomic status of the species is verified by Swezey, 1942. This species is not listed in the International Union for Conservation of Nature and Natural Resources Red Data List database (International Union for Conservation of Nature and Natural Resources database 2004).

List of Experts Contacted:

Name	Date	Place of Employment
Blaine Dicke	March 03, 2005	Guam Division of Aquatic and Wildlife Resources
Aubrey Moore	March 03, 2005	University of Guam
Ross Miller	March 03, 2005	University of Guam
Barry Smith	March 04, 2005 & July 11, 2005	University of Guam
Laura Williams	July 11, 2005	CNMI Division of Fish and Wildlife, Saipan
Donald Nafus	attempts to locate his new address via Barry Smith, of University of Guam, and by internet search was unsuccessful.	
Ilse Schreiner	attempts to locate her new address via Barry Smith, of University of Guam, and by internet search was unsuccessful.	
Anne Brook	September 19, 2005	U.S. Fish and Wildlife Service

List of Databases Searched:

Name	Date
International Union for Conservation of Nature and Natural Resources	2004

COORDINATION WITH STATES:

We contacted CNMI Division of Fish and Wildlife by email with a request for any information on the species and sent copies of our candidate forms. No response was received. We also contacted Guam Division of Aquatic and Wildlife Resources. They informed us that they had no additional information.

LITERATURE CITED

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APPROVAL/CONCURRENCE: Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes, including elevations or removals from candidate status and listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all resubmitted 12-month petition findings, additions or removal of species from candidate status, and listing priority changes.

Approve: **Acting** David Wesley
Regional Director, Fish and Wildlife Service

11/15/05
Date

Marshall P. Jones

Concur: _____
Director, Fish and Wildlife Service

August 23, 2006
Date

Do not concur: _____
Director, Fish and Wildlife Service

Date

Director's Remarks:

Date of annual review: 7/21/05
Conducted by: Lorena Wada, Pacific Islands FWO

Comments:

PIFWO Review

Reviewed by: Gina Shultz
Assistant Field Supervisor, Endangered Species
Patrick Leonard
Field Supervisor

Date: 9/29/05

Date: 10/11/05